LabView Toolkit Source Code

With Teledyne ISCO Syringe Pumps

Overview

A computer through RS-232 or USB serial interface can remotely communicate with a Teledyne ISCO D-Series controller (identification number 621240114 or higher). The Teledyne ISCO LabVIEW Software Developer Kit (Rev. 2.1.12 or higher) provides support of LabVIEW programs created by users using the RS-232 and USB interfaces.

This toolkit has a sample program (source code or executable) capable of running one controller with one to four pumps. The source code version's primary purpose is to provide an example to help the programmer start constructing custom programs for pump systems and applications. Custom programs can operate multiple pump controllers and information on the communications cables required for multiple controllers is included in this bulletin.

The toolkit is available for download at
www.teledyneisco.com/pumps/
pumps-software-and-firmware
as a ZIP file containing the following folders:

- Executable Installer (Compiled sample program. See technical bulletin TB39 for operating instructions.)
- LV2014 Source (Sample program source code - Discussed in this technical bulletin)

To modify the sample program (LV2014) in any way requires the complete LabVIEW Compiler (LabVIEW 2015 or newer) from LabVIEW's manufacturer:

National Instruments Corporation

www.ni.com

Tel: (800) 531-5066
Fax: 512-683-8411
11500 N. Mopac Expwy
Austin, TX 78759-3504

Cabling for Serial Control

The cabling scheme for your system will depend on the number of instruments you need to control. The computer is always connected from the serial port to the serial port(s) of the D-Series controller(s) it is controlling. Each controller is connected to its pumps in the normal fashion; i.e., the pump control cables are attached to the pump A, B, and C connectors on the rear panel of the pump controller. The cable you select to connect your network will depend on the type of serial port your computer has and the number of controllers you wish to connect.

Network communications are initiated by your computer.

## Connecting the Computer to Pump Controller

One Controller

To connect one controller, either use a serial modem cable (p/n 480-7996-00) or USB cable (p/n 68-1247-504).

See instructions
for cable selection
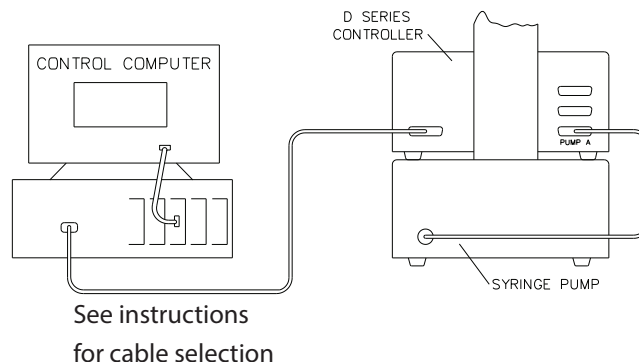
Figure 1: Drawing of cable connection

For RS232 Cable

To us the RS232 cable connection a 9 to 25 pin Serial Modem cable is needed (p/n 480-7996-00).

Plugs into RS232/485 Port

DB9 (female)   DB25 (male)
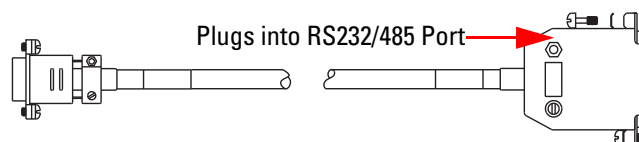
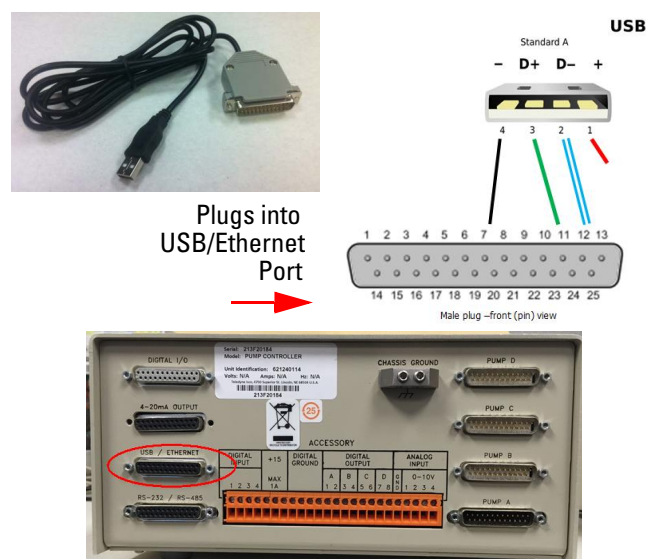| DB9 (female)	DB25 (male)
2	3
3	2
5	7
8	5

Figure 2: Serial Cable 480-7996-00, cable wiring, and plug location on controller rear panel

For USB Cable

The USB cable is a special USB Type A to 25 pin sub-D connector (p/n 68-1247-504).
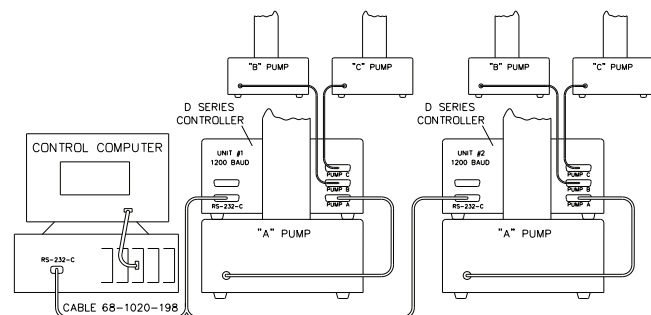

Figure 3: USB cable 68-1247-504, wiring, and plug location on controller rear panel

Two Controllers (Compiler required)

To connect two controllers in the network, use the 'Y' cable #68-1020-198, as shown in Figure 4.

☑ *Note*

In order for the network to operate properly, all instruments connected to the network must be turned on even if they are not being used.

Figure 4: Serial network connection example
(Dual connection)

Three or More Controllers (Compiler required)

If additional instruments are to be connected in series, use the daisy chain cable (p/n 68-1020-180). This cable is attached to the remaining connector on the 'Y' cable (Figure 4), and then to the RS-232-C connectors on the rear panels of the additional controllers. (See user manual Section 8-Serial Interface.)

User-Written Software

When designing software to control the D Series pumps, you must follow the DASNET communications protocol. DASNET allows a number of instruments to be controlled from a single RS-232-C serial port. Up to nine D Series controllers may share a single serial data channel, with each controller only accepting commands that are meant for it. Each pump controller can then control up to three pumps each.

DASNET

DASNET protocol converts your serial commands into a form recognizable to the ISCO pump controller. Using a computer language such as BASIC or C, serial commands can be converted and sent to your controller.

Example programs written in BASIC and C can be found in Section 8 of your D Series user manual. Both programs, plus a DASNET serial driver in Visual C++, are available on the CD-ROM (p/n 60-1245-096) in the back of your printed manual.

Serial Control Check List

In order to build and operate a custom program for ISCO syringe pumps, you must have the following:

1. Sample program (ISCO LabView toolkit).*
2. LabView Compiler (purchased separately).
3. Connection cable(s)
   a. 1 controller: cable 480-7996-00
   b. 2 controllers: cable 68-1020-198
   c. 3 to 7 controllers: cables 68-1020-198 and 68-1020-180.
4. Source code (serial commands in computer language for DASNET conversion).
5. DASNET serial driver.

*The toolkit comes with directories for two different versions of LabView. Copy the .zip files onto your computer.

Under LV2014 Source, the folders or files within each directory are as follows:

- Analysis
- Communications
- File I/O
- Instruments
- Type Def's
- User Interface
- Utilities
- ISCO Pump.ico
- ISCO Pump2.aliases
- ISCO Pump2.lvlsp
- ISCO Pump2.lvproj
- Pump Control.vi

Controller Setup

Once the system is properly connected, turn the pump, controller(s), and computer on. Then use the following procedure to place your controller(s) in serial control mode.

Press [MENU] > MORE ([A]) and select SERIAL ([1]).

> ☑ **Note**
> Factory controller default settings are baud rate 9600 and unit ID #6.

Restore Defaults (if desired)

To restore defaults, press [MENU], then SYSTEM RESET ([5]). **Resetting a system erases all programs and user settings.**

Change Defaults

1. Select the communication baud rate (between 300 and 57.6K) by pressing NEXT BAUD ([A]) until you reach the desired baud rate.

> ☑ **Note**
> All units in the network must be set to the SAME baud rate.

2. Select an identification number for each controller (up to seven) by pressing NEXT ID # ([B]) until you reach the desired number.

> ☑ **Note**
> Multiple controllers in a network must each have a different ID number.

If several units are being configured, place a label on the rear of each instrument listing the ID number and baud rate. This will help identify the controller in the future and prevent assigning the same ID number to two controllers or assigning an incorrect baud rate.

Verify Operation

To verify network operation, on your computer, open a terminal emulator program such as HyperTerminal and establish connection to the controller.

> ☑ **Note**
> If you will be using multiple controllers daisy-chained to a single serial port, you must connect and test each controller one at a time.

1. Press [MENU] > MORE ([A]) > MORE ([A]), and select DIAGNOSTIC MENU ([2]).

2. Select SERIAL TEST ([6]).

The SENT value displayed will increment indefinitely until you exit the test by pressing any key. This same value should appear on your computer screen. If it does not, verify that you are using the correct serial port on the computer, and that the communication cables are properly connected and in working order.

Preparing LabVIEW for Pump Operation

1. On the computer, start the LabVIEW program.
2. If the program is not communicating, the serial port dialog window will appear (See Figure 5).
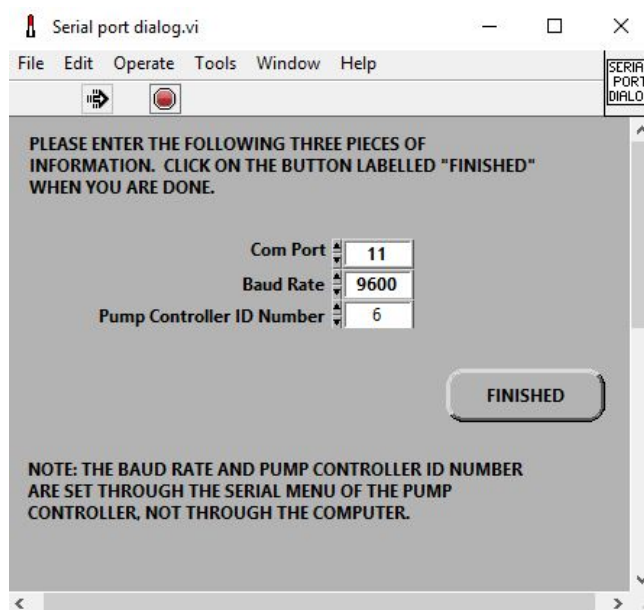

Figure 5: LabVIEW communication settings

3. Using the up/down arrows, ensure that the Baud Rate and Pump Controller ID Number match the setting on the pump controller SERIAL screen, and select the Com Port you are using (see Controller Setup). Click FINISHED to exit the screen.

> ☑ **Note**
> The LabVIEW control screen should appear. Refer to Figure 8 for the location of the basic controls described in the following sections. See Technical Bulletin TB39 for complete operation of the sample program.

4. In the upper left corner of the LabVIEW screen, click the Start button ⇨ which will change the button color to black ➡.

Indication for Remote

Indication or Local
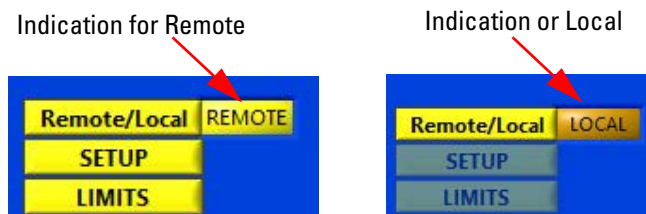
Figure 6: Remote/Local Indication

5. The box to the right of Remote/Local button should read either Remote or Local (See figure 6). Click on the Remote/Local button to toggle from Local to Remote for remote control. The controller screen should also show Remote on the lower left hand corner (See Figure 7).

CPx	X.XXX mL/MIN	XXXXX PSI	XX.XXXXL
RUNNING			XX:XX:XX
XX PSI			A XXX.XX mL
REMOTE			
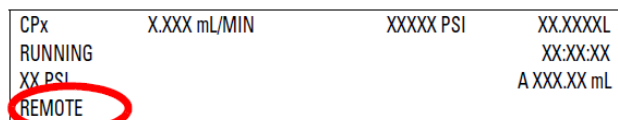
Figure 7: Controller display

Basic Settings and Commands

Some basic selections available in the sample program shown in Figure 8 (See Technical Bulletin TB39 for complete operation).
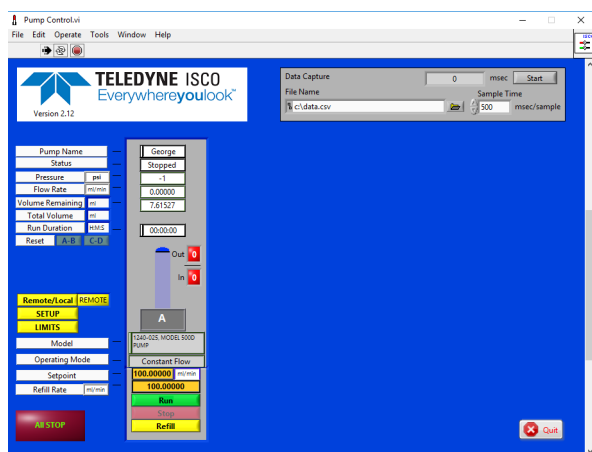
**Figure 8: Example Program main screen**

Pump Mode

To set Pump Mode, click on the SETUP button the select the MODE (Constant Flow, Constant Pressure, Continuous Const. Flow or Continuous Const. Pressure) for each pump under the MODE and PUMP designation (Figure 9).

Figure 9: Select operating mode

Set Points

On the main screen, click on the numbers to the right of the SETPOINT bar and enter the desired numeric value (See figure 10).
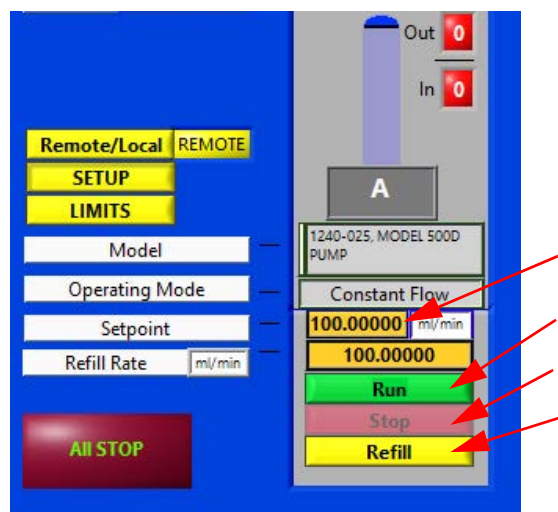
Figure 10: Set Points- Run, Stop, or Refill

Start/Stop

To Start, Refill or Stop each pump click either the RUN, STOP or REFILL buttons (See Figure 8).

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